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AMPHIBIOUS ASSAULT

An Arrow Best Left in the Operational Commander's Quiver?

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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Abstract of

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Naval superiority in the amphibious operating area is a fundamental prerequisite for amphibious assault. Today's Navy can no longer realistically expect to wrest such naval superiority from many of its potential foes. The U.S. Navy must be prepared to dominate multiple, distant theaters while adversaries need only defend their own backyards. U.S. forces must dominate the littoral battlespace, while the enemy may only need to disrupt, delay or demoralize to succeed. This asymmetric nature of littoral warfare undermines the expectation that today's naval forces can achieve naval superiority in the face of the modern, multi-dimensional coastal defenses of potential adversaries such as North Korea or China.

Today's naval leadership is shaping the Navy after Next to dominate the littoral battlespace of the year 2030. However, the threat that anti-ship missiles and submarines pose to today's amphibious task force has not received adequate scrutiny. As a result, amphibious forces are not training the way they will fight. Amphibious exercises do not realistically acknowledge the submarine and missile threats. During most exercises these threats are notional at best, and often simply assumed away. The assumption that the submarine and missile threats will be completely eliminated prior to an amphibious assault is no longer reasonable.

Today's operational commander should therefore table contingency plans that rely upon an opposed amphibious assault. Table them until we begin to train, game and exercise the way we will be forced to fight. Table them until the ability to achieve naval superiority in the amphibious operating area is explicitly demonstrated—not implicitly assumed.

Amphibious Assault

An Arrow Best Left in the Operational Commander's Quiver?

“To achieve success, an amphibious task force should be assured in the landing area of naval superiority against enemy surface and subsurface forces.”

Joint Pub 3-02¹

Introduction

The United States joint doctrine quoted above specifies the requirement for naval superiority when conducting amphibious operations. British amphibious doctrine similarly states that a “forcible assault launched from the sea against a hostile shore requires local, temporary command of the sea.”² Can the United States Navy reasonably expect to achieve even temporary command of the sea against tomorrow’s potential foes who will field an integrated coastal defense of modern diesel submarines, mobile anti-ship missile shore batteries, missile patrol boats, and mines? If a regional crisis requiring an amphibious assault occurred next year, can the operational commander reasonably expect the U.S. Navy to gain naval superiority against an enemy who has already developed a modern, integrated coastal defense? Perhaps more to the point, given the very short duration of modern conflict, can today’s operational commander reasonably expect to conduct an amphibious assault in time for it to be operationally useful? If the foe is an Iraq, an Iran, a North Korea or a China, and not a Grenada or a Somalia, the answer to all of these questions is no.

In addressing these questions, one must admit that our adversaries are able to prepare for warfare in a single theater of operations—in their own backyard—while the U.S. must be

prepared to deal with a number of contingencies in a diverse range of environments at considerable distance from home. U.S. forces must dominate such a battlespace to prevail, while the enemy may need only to "disrupt, delay or demoralize."³ An amphibious assault is, therefore, an asymmetric problem, an asymmetric problem of extreme difficulty.

The asymmetric threats that face the amphibious forces of today and tomorrow are numerous. The most important are mines, submarines, and anti-ship missiles. Much attention has been focused on the Navy's mine warfare deficiencies. The submarine and anti-ship missile threats to amphibious forces deserve the same close scrutiny.

These two issues are best framed by examining the evolution of the anti-ship missile in coastal defense, the evolving threat of modern submarines, the capabilities of today's Navy to wrest naval superiority from these threats, the impact of these issues on today's operational commander, and by examining the Navy's plans for the future. Conclusions and recommendations can then be made.

The Evolution of the Anti-ship Missile Threat

In his analysis of the lessons of the Falklands War, William Ruhe observed that modern "anti-ship missiles like Exocet, which are launchable from small craft as well as shore batteries, give smaller navies weapon power virtually unrelated to the size of the launching ship."⁴ The Japanese kamikaze attacks of World War II can be considered the forerunners of the modern anti-ship missile attack. The first use of the modern cruise missile, however, occurred in 1967 when Egyptian Navy patrol boats attacked and sank the Israeli destroyer *Eilat* with four Styx anti-ship missiles. Because the Egyptian patrol boats fired the missiles from inside their port, this engagement can also be considered the first instance of a coastal defense missile firing.

Since the Egyptians fired the first salvo in 1967, anti-ship missiles have been used in numerous conflicts. The most pertinent is the 1982 Falklands War, which provides examples of anti-ship missile employment in amphibious operations. Both Britain and Argentina launched anti-ship cruise missiles during the Falklands war. The British scored hits with AS-12 and Sea Skua air-launched anti-ship missiles fired at the Argentine submarine *Sante Fe* and at several Argentinean patrol boats. To avoid sinking, *Sante Fe* grounded herself. In addition, the British missiles sank one patrol boat and damaged two others. Argentina achieved more spectacular success with the Exocet missile. Air-launched Exocet missiles sank the British destroyer HMS *Sheffield* and the container ship *Atlantic Conveyor*. An Argentine shore battery also scored an Exocet hit on the destroyer HMS *Glamorgan*.

The history of the anti-ship missile shows that this highly effective weapon has been very difficult to shoot down, but relatively easy to decoy using chaff and electronic countermeasures. There have been very few reported cases of anti-ship cruise missiles being shot down. The British shot down only one of the Argentine Exocets during the Falklands war. There are, however, numerous examples of ships evading missiles with chaff clouds and electronic jamming. Israeli navy units successfully evaded all 55 Styx missiles fired at them by Arab patrol boats during the 1973 Arab-Israeli war. British ships also successfully evaded several Exocet missiles during the Falklands War.

Although chaff and electronic countermeasures are very effective, these defensive measures can be overcome by surprise. A successful defense depends on adequate reaction time. Significant time is required to launch chaff and engage with electronic countermeasures and defensive weapon systems. The defending ship must detect the

incoming missile early enough to have time to react. Surprise can rob a ship of the time needed to defend itself.

Several features of anti-ship missiles fired from coastal defense batteries or fast patrol boats combine to enable them to achieve an extremely high degree of tactical surprise. Radar returns from the missile are masked by radar clutter from coastal land features. The small size of missiles such as the Exocet makes them difficult to detect visually as well. Modern missile boosters use smokeless rocket motors that avoid easily seen booster plumes. The missile patrol boats can avoid detection by hiding among the radar masking terrain of a rugged coastline. The mobile missile launchers can also be hidden, and remote or visual targeting can be conducted to avoid the early warning gained from detection of the associated search radar.

Many of these factors came into play when a makeshift Exocet coastal battery attacked the British destroyer HMS *Glamorgan*. The missile was fired from a launcher that had been removed from a frigate and mounted on a trailer. Surprise was achieved. *Glamorgan* didn't launch chaff in time to decoy the missile, and was hit and damaged.⁵ In "Smart Weapons" William Ruhe points out that the importance of the element of surprise was one of the most important lessons of the Falklands War:

Anti-ship missiles were best used when they had a high element of tactical surprise. The Exocet hits were on targets which were virtually unaware of an impending missile attack. When the anti-ship missiles were expected, the use of decoys proved to be effective in preventing them from hitting their targets.⁶

Today's Anti-ship Missile Defense Capabilities

Even the most sophisticated of the U.S. Navy's anti-ship missile defenses possess only limited capabilities against modern anti-ship missiles such as the SS-N-22 Sunburn.

Russia specifically designed this weapon to attack Aegis equipped cruisers and destroyers. While Russia might no longer be considered an adversary, Russia is selling these missiles to potential U.S. foes. Iran, for instance, has already fielded a mobile shore-launched version of this supersonic missile.⁷ The surprise that can be achieved by a shore-launched missile with the Mach 2.5 speed of the Sunburn has the potential to make an amphibious assault against any country possessing such a weapon an improbable proposition.

If amphibious ships cannot defend themselves, and if surprise can overwhelm the defenses of even the most capable destroyer, then what defensive options exist? One long-standing assertion is that the maneuver capability which over-the-horizon assault achieves prevents an enemy from targeting the amphibious forces. Another is that air strikes will destroy the mobile missile launcher before the assault is conducted. Unfortunately, neither assertion remains valid.

Over-the-Horizon Targeting

The U.S. Navy has traditionally enjoyed the ability to avoid being detected and targeted at long ranges. The concept of over-the-horizon amphibious assault stresses this as a main advantage. This advantage no longer exists in the littorals, however. Network Centric Warfare requires continuous communications which may be susceptible to intercept by more sophisticated foes. Even less sophisticated adversaries now enjoy the use of Global Positioning System (GPS) receivers and satellite cellular telephones. GPS receivers and cell phones have the potential to make every coastal merchant vessel, fishing boat, and small craft a very effective targeting platform. While it is true that the United States may decide to deprive these satellite resources from a potential enemy, traditional navigation techniques

and coded radio transmissions can still provide adequate targeting information—especially if the defender is not concerned with accidentally attacking neutral vessels.

Furthermore, the extreme danger of being surprised makes it unlikely that amphibious forces will operate in a restricted emissions control posture during the assault. The British ships operated all of their radar systems during the Falklands engagements. It is highly likely that the U.S. Navy will do the same. Although an over-the-horizon amphibious assault will generally begin about 25 miles from shore,⁸ radar counter-detection ranges are usually greater than 25 miles. It will, therefore, be relatively easy for a sophisticated adversary to obtain a cross-fix on amphibious forces using electromagnetic lines of bearing. If a cross-fix cannot be obtained, then a single line of bearing provides sufficient targeting information with which to launch modern anti-ship missiles. As stated before, this is particularly true if the defender is unconcerned with neutral shipping.

Destroy the launchers first.

If targeting cannot be prevented, then the anti-ship missile threat must be neutralized by destroying the launchers before sending ships into the amphibious operating area. This can be done with air strikes (including Tomahawk missiles), ground forces, or a combination of the two. Each has advantages and disadvantages, but whichever method is used, the missile launchers must first be detected.

Detecting coastal defense anti-ship missile launchers can be extremely difficult. Most modern anti-ship missile systems are highly mobile. Some missile systems do not require prepared launching sites. There are several methods the enemy can easily utilize to make it much harder to detect or attack the launchers:

- Camouflage the missile launchers and deploy them in hidden launch sites.

- Deploy inexpensive decoys to dilute detection, targeting and attack resources.
- Construct hardened launch sites.

Iraq used all of these techniques with Scud short-range ballistic missile (SRBM) launchers during the Gulf War. It is therefore helpful to consider the lessons of the Gulf War Scud hunt when evaluating the feasibility of destroying coastal anti-ship missile defense batteries.

Coalition forces expended significant effort attempting to destroy Iraqi Scud launchers. Air strikes, ground forces, and the coordinated efforts of the two were attempted. Highly sophisticated systems such as F-16's equipped with LANTIRN⁹ targeting pods and JSTARS¹⁰ radar aircraft were used to try to track the mobile scud launchers. Although over 1,400 air strikes were conducted, the air strikes did not significantly reduce the rate of Iraqi Scud launches. The decision was then made to insert special operations forces on the ground to hunt the Scuds.¹¹ The special operations forces initially claimed a dozen Scud kills, including kills achieved by calling in F-15 air strikes, but later conceded that most, if not all, of their kills were decoys.¹² Despite these significant efforts, little success was achieved.

The Defense Intelligence Agency evaluated the success of the scud hunt as follows:

In spite of over a hundred claims of destroyed SRBM mobile missile launchers, national intelligence resources did not definitely confirm any of the "kills."... The Coalition's inability to permanently degrade SRBM command and control is also significant, despite determined efforts to incapacitate Iraqi military and civilian national networks. Even in the last days of the war, Baghdad retained a sufficient capability to initiate firings from new launch areas.¹³

Even the fixed launchers were difficult to destroy. The Defense Intelligence Agency estimated that as many as half of the twenty-eight fixed launchers were never destroyed.¹⁴

It can be argued that a hunt for anti-ship missile launchers might be easier than the Scud hunt. It certainly is true that a hunt for anti-ship missile launchers will be different than the Scud hunt. The most important difference is likely to be the range of the missiles. The

range of a Scud is an order of magnitude longer than that of anti-ship cruise missiles. The Scuds could therefore be hidden in many thousands of square miles, while the shorter range of anti-ship missiles requires placement of the launchers in a relatively small area along the coast. However, most coastlines are much more rugged than the Iraqi desert and many anti-ship missile batteries are more mobile than Scud launchers. Both of the factors would combine to significantly ameliorate the advantage of searching a smaller area during a future anti-ship missile hunt. While such a hunt may well enjoy more success than the Scud hunt, a high level of success cannot be realistically expected. If the potential adversary prepares his deception well, a significant number of missiles will survive to threaten amphibious forces.

The Evolving Submarine Threat in the Littorals

As U.S. maritime strategy has changed, so has the Anti-Submarine Warfare (ASW) challenge. The U.S. Navy was once focused on conducting ASW against Soviet nuclear submarines in the open ocean. Today's submarine threat, however, is characterized by fewer, stealthier, more lethal submarines operating in the very complex environment of the littorals. Advanced batteries and air independent propulsion technologies make diesel submarines less dependent on snorkeling, and therefore stealthier than in the past. The submarines of potential adversaries are also more lethal because many advanced-technology weapons, sensors and fire control systems are now available on the open market. The Navy Department's *1997 ASW Assessment* offers important insight into the enhancements that new technologies have provided potential foes:¹⁵

- New automated fire control systems simplify the development of an adequate fire control solution.

- Wake homing torpedoes currently finding their way into the inventories of potential adversaries are less demanding of the accuracy of the fire control solution and the skill of the approach officer.
- Modern heavyweight torpedoes are capable of inflicting serious damage to, or sinking with a single hit, even the largest ships, including major combatants and amphibious vessels.
- Modern anti-ship torpedoes are very difficult to counter.

These technological advances are adding to the already difficult challenge of conducting ASW in the littorals. ASW in the littorals is difficult because a submarine enjoys unique advantages when operated in coastal waters. The acoustic environment in coastal waters is extremely complex. Rapid changes in depth, bottom topography, salinity, and temperature all combine to severely limit acoustic detection ranges. Even a snorkeling diesel submarine can find acoustic cover in littoral waters. This is because the large number of diesel powered ships and fishing vessels that operate along the coasts of most nations provide the snorkeling diesel submarine with a high level of background noise in which to hide. Most important, the ability to patrol the relatively small, stationary areas associated with potential amphibious operations mitigates the diesel submarine's greatest deficiency—its slow speed relative to the ships it is maneuvering to attack. Coordinated use of submarines and minefields can further reduce the size of the diesel submarine's patrol areas. All of these factors combine to make littoral ASW extremely difficult.

Review of the Falklands War provides excellent examples of the difficulties involved in protecting amphibious forces from a diesel submarine. *San Luis*, a very old Argentine diesel submarine, tied up a considerable portion of the British Fleet in ASW operations. The British expended approximately 200 rounds of ASW ordnance, all on false targets. The British ASW effort failed to prevent this sole remaining Argentine submarine from gaining

attack positions on British ships.¹⁶ Apparently, only operator error prevented the Argentine submarine *San Luis* from successfully attacking its British targets.¹⁷

Today's ASW Capabilities

Exercises designed to provide data on the effectiveness of U.S. Navy ASW operations in the littorals have been conducted for several years now. The Surface Warfare Development Group (SWDG) has analyzed the data from these littoral exercises and published a report entitled *COMSURFWARDEVGRU Technical Report SZ5050-1-98, Cross SHAREM (Ship ASW Readiness Effectiveness Measuring Program) Analysis of ASW Force Mission Effectiveness During Littoral USW Exercises, 1993-1998*. One of the conclusions reached in the report was that ASW forces routinely achieved a very high percentage of mission accomplishment. The report defined mission accomplishment as protecting the high value unit(s) from successful attack. This conclusion, however, holds only limited application in assessing the feasibility of future amphibious operations. This is because very few of the SHAREM exercises were conducted in a true amphibious scenario: one in which ASW forces defend an amphibious task force operating in an amphibious operating area during an amphibious assault. There is so little data because naval exercises are generally conducted in distinct phases, with the ASW phases of the exercise nearly always separated in space and time from the amphibious operations. The submarine threat in the amphibious operating area during an exercise is almost always a notional threat—existing on paper only. Amphibious exercises are rarely conducted with frigates and destroyers defending the amphibious task force in the amphibious operating area, as would be the case in real assault.

During the vast majority of exercises in which the ASW forces claimed mission success, the submarine was not located until it took the first shot. Because very few

exercises were conducted with actual amphibious ships in an amphibious operating area, this first shot was nearly always an attack on an ASW ship. Since the targeted ship was an ASW ship, the ASW ship was frequently able to take defensive action and either evade, counterattack or both—many times successfully. This drastically skews the conclusions, because an un-located submarine with an experienced crew will not shoot at the screening units first, but, rather, will take the first shot on the most important amphibious ship. Shooting at the amphibious ships first will not be difficult because the ships will be loitering in the amphibious operating area, greatly simplifying the diesel submarine's hardest task—maneuvering to an attack position. This assertion is backed up by the *1997 ASW Assessment*, which states that:

Given the luxury of selecting the time, place and target to attack, a submarine with a moderately-well trained crew has an excellent chance of firing the first shot—even against a technologically and tactically superior opponent.¹⁸

The few exercises that were conducted with amphibious ships, or with ships simulating high value units, were mostly conducted as choke point transits. Defending against a submarine in a choke point is easier than defending in an amphibious operating area. Even in a choke point, amphibious forces can still use speed and maneuver, but unless they desert the Marines already ashore, the amphibious ships lose the ability to maneuver once an amphibious assault begins. For this reason, ASW success in defending an amphibious task force in an actual amphibious operating area will undoubtedly be much poorer than currently advertised.

ASW capability is very difficult to quantify and analyze in absolute terms. It is much easier to quantify trends. Fleet ASW proficiency has significantly declined in recent years. This decline in ASW proficiency is documented in the Navy Department's *1997 Anti-*

Submarine Warfare Assessment. The assessment concluded that the “opportunities to practice ASW have declined because of multi-mission tasking. [For example] S-3’s are now primarily tankers.” The report further stated that “the ability to hit a submarine target has declined for weapons fired by U.S. surface combatants and aircraft.”¹⁹

Of course, the operational commander will certainly assign attack submarines to help locate and destroy the enemy’s submarine fleet. But review of SHAREM exercise results indicates that adding U.S. submarines to the ASW effort does not increase ASW capability out of proportion to the number of ASW assets. In other words, adding a submarine to an ASW operation already being conducted by four ships increases the probability of mission success by 25%--no more. This occurs because, in the littorals, the extremely short detection ranges of submerged diesel submarines rob U.S. submarines of the acoustic advantage they enjoy in the open ocean. In other words, using attack submarines certainly helps, but attack submarines are not a magic elixir that will make the littoral ASW problem disappear.

One way to avoid the difficult challenge of destroying an enemy’s submarines at sea is to destroy them before they sortie. But the rules of engagement that will be in force prior to hostilities in most any future conflict will undoubtedly prohibit preemptive attacks. A savvy enemy will surely sortie his submarines before initiating hostilities.

The submarine therefore provides an asymmetric leverage that makes it an extremely effective sea denial platform. As the *1997 ASW Assessment* observes:

Potential adversaries such as Iran, operating a handful of advanced submarines in the complex acoustic environment of the littorals, could delay or disrupt operations to the point that U.S. strategic objectives could be impeded.²⁰

The Impact on Today's Operational Commander

Many operation plans include amphibious assaults in the early phases of their wars. One example where an early amphibious operation would be desirable is the U.S. response to a hypothetical North Korean invasion of South Korea. The operational commander might want to conduct an amphibious assault to put forces ashore on the East Coast of Korea, north of the border. Such a force could then threaten North Korean lines of communication and set up an anvil/hammer operation, as did the Pusan landing in the first Korean war. Clearly the faster such an assault is conducted, the more the ground battle benefits.

However, even with an over-the-horizon assault, amphibious operations must wait until local naval superiority is achieved. The examples and discussions above have shown that modern submarines and advanced anti-ship missiles have made achieving this superiority tremendously more difficult than it has been in the past. But how difficult? Vice Admiral Arthur Cebrowski, Naval War College President, recently testified to Congress that "right now judging threats, I believe we can do reasonably well."²¹ Unfortunately, recent war games prove him overly optimistic. War-gaming has shown that it may take months instead of days to fight our way into the littoral.²² Such a delay must inevitably alter the operational commander's sequencing and synchronization. Given the short duration of many recent conflicts, such a delay could result in the war ending before the Navy could get the Marines into the battle—a win for the enemy's coastal defenses—and a major setback for the operational commander.

The Navy's Plans for the Future

There is unanimous agreement about the challenge of the future. Navy leadership has explicitly acknowledged the future challenge of operating in the littorals against modern

coastal defenses. Vice Admiral Cebrowski has recognized that "the Navy after Next could become tactically unstable in the face of sophisticated area denial strategies—great eggs, but too few baskets."²³ Admiral Jay Johnson, Chief of Naval Operations, no longer believes that naval force levels previously thought acceptable are sufficient to operate in the littorals of the future.²⁴ Vice Admiral Cebrowski has also said: "combat power without access... will have little utility in the Navy after Next."²⁵

The ability to achieve access to the littorals in the face of the sophisticated coastal defenses of the future has become known as Assured Access.²⁶ Admiral Johnson has characterized the capabilities required to assure access. He states that the force must be designed for speed, maneuver, sensing, and robustness. The force must be fully networked; capable of dispersed firepower that can service mobile and time critical targets. And it is critically important that the Navy after Next be built in numbers sufficient to lower the relative target value of each individual ship in order to reduce the threat from the asymmetric foe.²⁷ Assured Access has become one of the capstone framing issues for the concept of Network Centric Operations.²⁸ Navy after Next initiatives such as Street Fighter²⁹ are already underway. Today's naval leadership is actively shaping the Navy after Next so that it will be a tactically stable force that will assure access to the littorals of the future.³⁰

Recommendations for Next Year's Navy.

It seems clear that the Navy's acquisition strategy will adequately address the littoral challenges of the future. The ability to gain sea superiority in the amphibious operating areas of the year 2020 seems assured. But what about today's Navy?

Perhaps many people, in the face of the mine threat and the inadequacy of naval surface fire support, have written off amphibious assault until the Navy after Next arrives.

The Honorable H. Lee Buchanan, Assistant Secretary of the Navy recently testified to Congress that naval surface fire support “will not fully meet Marine Corps requirements” until 2020.³¹ Perhaps this is an indication that some Navy leaders have tabled amphibious assault until then. But the strategic and operational requirements for an amphibious assault have not evaporated. And the war plans remain in place. So what can be done to better support next year’s amphibious task force? Several things can be done in the near term.

The first is more realistic exercise training. Amphibious forces and their supporting battle group assets are not training the way they intend to fight. If contingency plans include an amphibious assault on North Korea, there is little doubt that at least a few North Korean submarines will remain a threat throughout the conflict. The amphibious task force will have to be protected from a submarine threat in the amphibious operating area during the assault. A review of Pacific Fleet exercises shows that no recent exercises combined amphibious and ASW operations in the amphibious operating area. ASW (and the anti-ship missile defense problem) should be integrated into the amphibious assault phase of as many exercises as possible.

The second is a SHAREM initiative that can produce great near-term dividends. SHAREM exercises currently focus on collecting ASW data in the littorals. Unfortunately, this does not scrutinize the most difficult challenge, which is ASW in direct support of amphibious forces operating in the amphibious operating area. As the fleet moves to conduct the exercises as suggested above, these exercises should include SHAREM data collection.

The third is war gaming. These amphibious assault vulnerability issues should be thoroughly evaluated in war games. Detailed modeling and extensive gaming of the littoral

challenge can help assess the feasibility of the amphibious assault against today's potential adversaries.

Finally, amphibious assaults against potential enemies possessing modern coastal defenses should be written out of the war plans until such time as the capability to gain sea superiority can be proven in exercises and war games.

Conclusion

"A ship's a fool to fight a fort."

Horatio B. Nelson³²

Nelson said, "a ship's a fool to fight a fort." Modern diesel submarines on coastal patrol and new generation anti-ship missiles are completing the naval mine's task of turning entire coastlines into modern day Nelsonian forts. Properly integrated by a determined foe, modern coastal defenses can turn the littorals into fools' territory.

Current U.S. Navy acquisition programs will provide the Navy after Next the tools to prevail against the Nelsonian forts of the future. But that does not help today's Navy. Nor tomorrow's. It is therefore time for today's Navy to adjust to the reality of modern coastal defenses. Today is the day to train, game and exercise the way we plan to fight. If doing so doesn't explicitly demonstrate the ability to rapidly gain naval superiority in the amphibious operating area, the Navy must put the amphibious assault arrow back in the operational commander's planning quiver, at least until the longbow of the Navy after Next is fielded.

Notes

¹ Joint Chiefs of Staff, *Joint Doctrine for Amphibious Operations* (Joint Pub 3-02) (Washington, D.C.: 8 October 1992), I-7.

² Joseph Alexander and Merrill Bartlett quoted in Neil J. Hall, "British Gators Modernize." U.S. Naval Institute *Proceedings*, March 2000, 80.

³ Navy Department, *1997 Anti-Submarine Warfare Assessment*. (Washington, D.C.: 1998), 5.

⁴ William J. Ruhe, "Smart Weapons," *Military Lessons of the Falkland Islands War: Views from the United States*, ed. Bruce W. Watson and Peter M. Dunn (Boulder, Colorado: Westview Press, 1984), 94.

⁵ Max Hastings and Simon Jenkins, *The Battle for the Falklands*, (New York: Norton, 1983), 296.

⁶ Ruhe, 93.

⁷ "SS-N-22 Sunburn," *Periscope*, USNI Military Database (1 August 1999), <<http://www.periscope.ucg.com/docs/weapons/missrock/antiship/w0004288.html>> (24 March 2000).

⁸ Michael H. Evans, *Amphibious Operations: The Projection of Power Ashore* (London: Brassey's, 1990), 191.

⁹ LANTIRN: Low-altitude Navigation and Targeting Infrared Systems for Night.

¹⁰ JSTARS: Joint Tactical Aerial Reconnaissance/Surveillance.

¹¹ Michael R. Gordon and Bernard E. Trainor, *The General's War: The Inside Story of the Conflict in the Gulf* (Boston: Little, Brown, 1995), 244.

¹² *Ibid.*, 246.

¹³ March 1991 Defense Intelligence Agency memorandum, quoted in Michael R. Gordon and Bernard E. Trainor, *The Generals War* (Boston: Little, Brown and Co., 1995), 227.

¹⁴ *Ibid.*, 238.

¹⁵ *1997 ASW Assessment*, 6.

¹⁶ William J. Ruhe, "Submarine Lessons," *Military Lessons of the Falkland Islands War: Views from the United States*, ed. Bruce W. Watson and Peter M. Dunn (Boulder, Colorado: Westview Press, 1984), 10.

¹⁷ Sandy Woodard, *One Hundred Days: The Memoirs of the Falklands Battle Group Commander*, (Annapolis, Maryland: Naval Institute Press, 1992). 142.

¹⁸ 1997 ASW Assessment, 6.

¹⁹ Ibid., 2.

²⁰ Ibid., 8.

²¹ Arthur Cebrowski. Quote from: U.S. Congress: Hearing of the Subcommittee on Emerging Threats and Capabilities of the Senate Armed Services Committee. "Joint Vision 2010." (20 October 1999). Text from: *Federal Information Systems Corporation Federal News Service*. Available on: *Congressional Universe* (Online Service). Bethesda, MD: Congressional Information Service.

²² Dennis Hopkins, Deputy Director, War Gaming Department, Center for Naval Warfare Studies, interview by author, 5 May 2000, McCarty Little Hall, Newport, Rhode Island.

²³ Arthur K. Cebrowski and Wayne P. Hughes, Jr., "Rebalancing the Fleet," U.S. Naval Institute *Proceedings*, November 1999, 33.

²⁴ Jay L. Johnson, "Numbers Do Matter," U.S. Naval Institute *Proceedings*, November 1999, 32.

²⁵ Cebrowski and Hughes, 33.

²⁶ Dennis Hopkins, Deputy Director, War Gaming Department, Center for Naval Warfare Studies, interview by author, 5 May 2000, McCarty Little Hall, Newport, Rhode Island.

²⁷ Johnson, 32.

²⁸ Center for Naval Warfare Studies, *GLOBAL 2000*, Brief for the CNO's Special Planning Group, U.S. Naval War College, Newport, Rhode Island: 14 March 2000.

²⁹ For a description of the Street Fighter concept see Cebrowski and Hughes, 34.

³⁰ Cebrowski and Hughes, 32.

³¹ H. Lee Buchanan. Quote from: U.S. Congress: Hearing of the Subcommittee on Seapower of the Senate Armed Services Committee. "Ship Procurement and Research and Development." (2 March 2000). Text from: *Federal Information Systems Corporation Federal News Service*. Available on: *Congressional Universe* (Online Service). Bethesda, MD: Congressional Information Service.

³² Horatio Nelson, quoted in Jeter A. Isely and Philip A. Crowl, *The U.S Marines and Amphibious War: Its Theory, and Its Practice in the Pacific*, (Princeton, New Jersey: Princeton University Press, 1951), 38.

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